Final Project Report to the NYS IPM Program, Agricultural IPM 2003-2004

Title: Increasing Utilization of Native Plants and Powdery Mildew Resistant Plants for NY Gardens

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Type of grant: Pest-resistant crops

Project location: Ithaca, NY; findings may be applied nationally

Abstract:
Plants that perform without pesticide inputs are attractive to gardeners. Commercial growers need to be shown specific examples of what they can offer to the public. We showcased native garden plants and perennials resistant to powdery mildew to growers, nurserymen and landscapers at the Cornell Greenhouse Horticulture Open House and Field Day, in Ithaca, and reported on the results of our trial at numerous grower meetings regionally and nationally.

Background and justification:
Many modern gardeners are motivated to switch their gardening to be both less labor intensive and less pesticide-intensive. Sometimes there is a lag between gardeners' interests and the availability of the plants that help them to meet these goals, or a lack of information that helps them find plants that are good choices. In this project, we demonstrated desirable native plants for New York gardens, and the benefit of choosing powdery mildew resistant cultivars of two popular herbaceous perennials, monarda (*Monarda didyma* and *M. fistulosa*) and garden phlox (*Phlox paniculata*).

Monarda and phlox are notorious for powdery mildew, but cultivars with a wide range of disease susceptibility exist. Often the plant catalogues are not the best location for reliable disease susceptibility information, so that objectively determined data from a research trial is very valuable to growers deciding what plants to offer for sale.

Studies conducted by M. Daughtrey and S. Clark at the Long Island Horticultural Research Laboratory in 1991 and 1992 (funded by the Perennial Plant Association) identified a wide range of susceptibility to powdery mildew in the 25 cultivars of *Phlox paniculata* examined. These results were reported in the *Proceedings of the 1992 Perennial Plant Symposium*, in the *LIHRL Annual Report*, and in many presentations to perennial plant growers. One of the white phlox identified as very resistant in that study, the cultivar 'David', was the Perennial Plant of the Year in 2002, largely because of its eventually widely-recognized disease resistance. Although the Long Island studies and those by Leonard Perry at the Univ. of VT (http://pss.uvm.edu/ppp/pubs/coh39mildew.htm) have been helpful to the industry, there is still a

need to compare more cultivars and to publicize the less disease-susceptible cultivars to the gardening public and the commercial producers.

At Bluegrass Lane, in Ithaca, there is an extensive collection of perennial plants managed by Dr. Bill Miller and his students. These plants were grown in the Netherlands and supplied to him by the importing companies. This is a very interesting collection of herbaceous perennials, including diversity in growth habit from groundcovers to 7 ft tall perennial sunflowers, and blooming times from early spring until late fall. The purpose of the collection is to determine the best types for Upstate New York and similar climates. There is no effort made to incorporate design into the planting, but the plants are well cared for. The plants that are not suited to the weather will decline or show stress in some way. Our display garden, in contrast, contained only North American natives or cultivars derived from them, and the plants were selected in number, color, and height to show off their beauty in mid to late summer.

This project provides growers and home gardeners with reliable information that they can immediately put to use in the garden. Home gardeners will use attractive native plants and non-pesticidal controls for diseases if they are given clear direction.

Pesticide use reduction through changes in gardening behavior will reduce pesticide runoff from NY gardens and protect groundwater quality on Long Island. Every success with a disease-resistant plant will encourage gardeners to make the effort to find resistant cultivars for other species that they wish to grow.

Objectives:

1. Demonstrate to ornamentals producers and landscapers that native perennials can be beautiful as well as suited to sustainable landscapes.

2. Compare 30 cultivars of *Phlox paniculata* and *Monarda didyma*.

3. Promote the use of the disease-resistant plants that are identified.

4. Evaluate the project.

Procedures:

1. Native Plant Demonstration Garden Development: An assortment of choice native perennial grasses and hardy herbaceous perennials were selected and arranged in an attractive design. Suitable natives developed to promote hardy, low maintenance plants were chosen from lists available from Pennsylvania and Maine Cooperative Extensions, and also from Talmage Farms on Long Island. The demonstration garden was prepared in a trapezoidal bed about 8 ft deep, 20 ft wide at the front and 26 ft wide at the back. The plot was photographed during the season to illustrate a feature on the IPM web site with the plot design. A resource list was developed, as well as a flyer explaining the virtues of the selected plant materials that was supplied to attendees at the Cornell Horticultural Open House and Field Day held August 16, 2003.

2. Powdery Mildew Cultivar Resistance Trial Plot: Phlox and monarda plants in 2-gal containers were obtained from commercial growers and grown in a replicated design in a second trapezoid-shaped plot, with the same dimensions, at the Bluegrass Lane facility of Cornell University. A cultivar of each species that is known to be highly susceptible was included for comparison. Work-study students under the direction of Bill Miller maintained the plots. Data was collected monthly (beginning in mid-summer) on the percentage of foliage covered by powdery mildew and was statistically analyzed (Fisher's Protected LSD). Plots containing phlox and monarda were open for inspection at the Open House and Field Day held August 16, 2003 (this audience was composed of

greenhouse and nursery growers and landscapers). Attendees received a handout describing the results of the trial. The information obtained on disease resistance of various phlox and monarda cultivars has also been extended to Master Gardeners, to attendees of the LIHREC Open House, and to attendees at the national Ball Perennial Conference during 2003.

3. Survey. Attendees to the Cornell Annual and Perennial Field Day will be surveyed to find out what cultivars of phlox and monarda and what native plants they grew in 2002. Six months to a year later, these attendees will be re-surveyed by mail to see if they have grown any cultivars that they learned about at the Field Day. We will also ask if they have used disease resistance information to market plants to their customers or expanded their product line to include native plants.

Results and Discussion:

The Floriculture Open House and Field Day was held on Saturday, August 16. There were 68 registrants and about 20 additional participants from supporting industries, CCE faculty, students and staff. From the evaluations we received, we know that many of those attending were very interested in the outdoor demonstrations and perennials. The people viewing the disease trial and natives plot told us that they really valued that type of education.

At the time of planting in early June, some of the monarda and phlox plants were already infected with sporulating powdery mildew lesions. This was the source of inoculum, should conditions be right for spread of the pathogen, allowing the plants to be tested for resistance. It was a summer that was ideal for testing resistance to powdery mildew, and by August 16 there was a heavy coverage of powdery mildew on the most susceptible cultivars tested.

The following table shows the disease severity ratings of the *Phlox paniculata* and *Monarda* cultivars used in the summer 2003 trial. The visual rating is based on the percentage of infected leaves, and the amount of leaf area that was covered with powdery mildew, on two different dates. The data shows significant differences between the cultivars in this experiment. The garden phlox Miss Elie and David were considerably more resistant than the others. The monarda cultivars Fishes, Snow White and Jacob Cline were healthier than the others tested.

Powdery Mildew on Phlox and Monarda, Ithaca plots, 2003

	PM cover	
Variety	July '03	August'03
P. Blue Boy	4.0 c	3.6 bc
P. David	2.2 ab	1.0 a
P. Eva Cullum	3.2 bc	3.8 c
P. Laura	3.2 bc	3.8 c
P. Miss Elie	1.8 a	2.8 bc
P. Miss Universe	3.6 c	3.8 c
P. Nicky	3.0 abc	2.8 b
P. Prime Minister	3.0 abc	3.2 bc
P. Windsor	3.8 c	3.8 c
	P=.0350	*P=.0001*

Variety	July '03	August'03
M. Blue Stocking	5.0 c	3.6 d
M. Blue Stocking 2	4.4 bc	3.2 cd
M. Fishes	1.0 a	1.0 a
M. Jacob Cline	1.2 a	2.4 bc
M. Marshall's Delight	3.6 b	2.0 b
M. Snow White	1.0 a	1.0 a
	P=.0350	*P=.0001*

The phlox and mildew cultivar powdery mildew resistance trial provided ready-to-use information to the growers who attended the Cornell Greenhouse Horticulture Open House and Field Day in August. Wholesale growers could observe firsthand and choose to grow the best-performing cultivars for their clients, and retailers and gardeners could seek to purchase the least mildew-susceptible cultivars. In addition to the demonstration at the Field Day event, the results of this trial were also presented at the Long Island Horticultural Research & Extension Center Open House on September 9, 2003 and at the Ball Perennial Conference in St. Charles, Illinois on September 29. The results will also be presented to the combined NYS Arborists and Landscape Gardeners Conference in Wading River, NY on January 11, 2004, and will be distributed in the 2003 *Annual Report of the LI Horticultural Research & Extension Center*.

There is little information available to gardeners on powdery mildew susceptibility outside of catalogues, so this season's effort adds useful data to what has been developed earlier for the Northeast. Gardeners are more than willing to utilize less disease-prone plants once they are given reliable information on how to make that choice, and wholesale growers will supply what the public demands. A continuing supply of data on garden plant performance with respect to diseases (such as generated in this project) would be extremely helpful to gardeners, and would help them to reduce their pesticide use.

The entire natives garden was dug in October and moved to the Geneva Experiment Station on October 14. Many of the plants had tripled in size, and were divided at planting. This garden is situated in the lawn to the west side of the Station, next to a memorial planting of crabapple trees. With the name tags in place, it will continue to be a native plants demonstration. Additional natives that bloom in spring will be added as appropriate.

Samples of materials

- Native Plants for New York Landscapes handout
- Illustration of powdery mildew resistance in phlox and monarda
- Images of presentations made at the Field Day

Native Plants for New York Landscapes

What is a native plant? Rather than join the debate, we hope to expand your knowledge and appreciation for these varieties generally considered native to northeast North America and its neighboring prairies. In our demonstration garden you will find plants that grow in the wild, their cultivars and related species.

'Native' plants tend to be easier to grow in the soils and climate zones of New York. Natives also reintroduce habitat for birds, insects and animals that may have been reduced by the introduction of exotics and hybridized plants. It is better to have variety in the landscape rather than to rely on a few favorite plants, especially those that may become aggressive, or are planted in such abundance that they have altered the ecosystem they now thrive in.

Availability, demand and familiarity affect landscaping trends; we suggest you consider adding more of these native plants and their cultivars. As a result, you may find less maintenance, more pest and disease resistance, and an increase in butterflies, birds and beneficial insects. Only by trying these plants will you be able to realize their benefits; not all native plants will be problem-free. Experience will show which plants are reliable in various landscape settings. The following profiles will help get you started.

Native Plant Profiles

Swamp Milkweed or Butterfly Weed *Asclepias incarnata* 'Soulmate'. Full sun. Unlike its upland cousin, Swamp Milkweed prefers moist or marshy soils and is often found near streams. Height will vary due to conditions. Attracts many insects and butterflies; Ruby Throated Hummingbirds enjoy it, too.

Blue Lyme Grass *Elymus arenarius* 'Blue Dune'. Coarse, aggressive; a filler with attractive foliage. Rhizomatous, it is best for open spaces. Likes full sun and well-drained soil. Cut back in early spring.

Prince Calico Aster *Aster lateriflorus* 'Lady in Black'. Part of a very large native family, Asters are easy and dependable late season perennials. This cultivar of our native aster has purple foliage with small white flowers. Likes sun, can tolerate some shade; makes nice cut flowers. Thousands of blossoms, great for butterflies.

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more Native Plant Profiles

Purple Love Grass *Eragrostis spectablis.* Loosely flowered stems in August and September. It prefers dry or sandy soil, and exhibits bunching growth.

Wild Bergamot *Monarda fistulosa.* Blooms in July and August, likes sandy or dry conditions. Native to meadows, expands by rhizomes. A notably pleasant fragrance.

Beebalm *Monarda didyma* 'Marshall's Delight'. Likes moist, average soil, and partial shade to full sun. A fragrant hummingbird magnet. This cultivar is mildew resistant and highly recommended.

Pink Threadleaf Coreopsis or Tickseed *Coreopsis rosea.* Prefers sun and moist soils, grows in mounds and can be divided in spring. Makes nice cut flowers, and self seeds.

Spike Gayfeather *Liatris microcephela* and Blazing Star *Liatris spicata.* Liatris likes sandy soil best with full sun or partial shade. Divide the root mass in spring to propagate.

Joe Pye Weed *Eupatorium maculata* 'Gateway'. Can grow to an exuberant 6 feet tall, prune back to half height in mid-June to reduce size. Likes moist soil, full sun to partial shade. Divide in spring. This garden favorite is excellent for bees and butterflies.

Little Bluestem *Schizachyrium scoparium.* Likes full sun, loam or sandy soil. Grows to 2 – 3 feet tall. A nice grass backdrop for summer foliage, it shows off its own indigo blue flowers in October.

Purple Coneflower *Echinacea purpurea* 'Rubenstern'. Likes full sun, drought resistant; prefers well drained soils. It flowers July through September. One of the best known natives, makes a nice cut flower and dries well.

Goldenrod *Solidago* 'Golden Baby'. A compact, spectacular cultivar of the misunderstood native Goldenrod. Likes full sun and well-drained soil.

Black Eyed Susan *Rudbeckia fulgida* 'Deamii'. Its' tall, upright growth prefers sun and loamy soil. Showy and easy to grow.

Cardinal Flower *Lobelia cardinalis.* Doesn't tolerate drought as it prefers moist loamy or clay soils. Plant in partial shade to full sun to enjoy its intense red show.

New England Aster *Aster novae-angliae* 'Purple Dome'. Likes full sun and medium moisture. A low maintenance perennial, it attracts butterflies with blooms from mid- August to October. Generally 12-20".

Butterfly Weed, *Asclepias tuberosa* 'Gay Butterflies'. Likes full sun and tolerates dry soil, in fact it does not tolerate wet soil. Does not transplant well, but does self seed.
(Remove seed pods to reduce spread) Clump growth, spreads by tuberous roots. Butterfly weed has a very long bloom period; this particular mix provides red, pink, orange, gold and bicolor flowers. Its leaves are food for the Monarch Butterfly larvae.

Sundrops, Evening Primrose *Oenothera fructicosa* 'Lemon Star'. Happy in average soil with full sun, it can grow from 1 to 3 feet tall and flowers for a lengthy time, May through August.

Meadowsweet or Queen of the Meadow *Filipendula* 'Kakome'. Likes our local alkaline soil, partial shade to sun. Outstanding foliage as well as beautiful flowers.

NYS IPM Project: Choosing Powdery Mildew Resistant Perennials
Photos show phlox and monarda in photographs taken July 2003 in Ithaca, NY From upper left: Monarda 'Blue Stocking' (covered with powdery mildew, Rating 5.0) and (upper right) the top performing Monarda 'Jacob Cline' (Rating 1.2). At lower left, Phlox 'Eva Cullum' (Rating 3.2) and (lower right) Phlox 'Miss Elie' (Rating 1.8)